ELECTRICAL AND ELECTRONICS ENGINEERING

B. TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

Department Vision

Transforming the individuals into globally competent Electrical Engineers to accomplish the technological needs of the society.

Department Mission

- Establishing world class infrastructure in Electrical Engineering.

- Adopting continuous improvement methods in content delivery and assessment.

- Facilitating industry institution interaction in teaching & learning, consultancy and research activities to fulfil the technological needs of the society.

- Encouraging the faculty and students to carry out innovative research and practicing ethical standards.

- Motivating the students for active participation in co-curricular and extracurricular activities.

Program Educational Objectives (PEOs):

PEO1	Graduates will be technically sound to have vibrant careers in core & IT sector.
PEO2	Graduates will compete, sustain, lead and enhance in competitive world.
PEO3	Graduates will serve the nation by solving technical problems with professional ethics and social responsibility

Program Specific Outcomes (PSO's):

PSO1	The ability to analyse, design and implement power systems, power electronics, control systems using software systems.
PSO2	The ability to apply project management techniques to electrical & Electronics systems & to utilize applied differential equations, matrices, different transform methods, discrete mathematics in support to the program.

Program Outcomes (POs):

Engineering Graduates will be able to:

1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustain able development.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understandingoftheengineeringandmanagementprinciplesandapplythese to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course outcomes (Cos) of all courses of all programs offered by the institution

	Course Outcomes for First Year First Semester Course
Course Code: B17 BS 1101	
Course Title: ENGLISH – I	
CO-1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
CO-2	Gain confidence and competency in vocabulary and grammar.
CO-3	Listen, speak, read and write effectively in both the academic and non- academic environment.
CO-4	Extend his/her reading skills towards literature.
CO-5	Strengthen his/her analytical and compositional skills.
Course Code: B17 BS 1102	
Course Title: MATHEMATICS – I	
CO-1	Solve linear ordinary differential equations of first order and first degree. Also will be able to apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-2	Solve linear ordinary differential equations of second order and higher order. Also will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
CO-3	Determine Laplace transform and inverse Laplace transform of various functions.
CO-4	Use Laplace transforms to solve a linear ODE.
CO-5	Calculate total derivative, Jocobian and maxima/minima of functions of two variables.
CO-6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and non homogeneous PDEs.
Course Code: B17 BS 1105	
Course Title: ENGINEERING CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials , solar materials, lubricants and energy storage devices.
Course Code: B17 ME 1101	
Course Title: ENGINEERING MECHANICS	
CO-1	Determine the resultant of the given force systems.
CO-2	Analyze force systems using equations of equilibrium.
CO-3	Determine centroid, center of gravity and moment of inertia of areas and bodies.
CO-4	Analyze trusses and simple beams.
CO-5	Distinguish between kinematics and kinetics.
CO-6	Apply the work energy and impulse momentum methods of various engineering problems.
Course Code: B17 ME 1102	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to represent dimensions of an object.
CO-2	Construct polygons and engineering curves.
CO-3	Draw projections of points, lines, planes and solids.
CO-4	Represent the object in 3D view through isometric views.
CO-5	Convert the isometric view to orthographic view and vice versa.
Course Code: B17 CE 1101	
Course Title: ENVIRONMENTAL STUDIES	
CO-1	To bring awareness among the students about the nature and natural ecosystems
CO-2	Sustainable utilization of natural resources like water, land, energy and air
CO-3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
CO-4	Safe guard against industrial accidents particularly nuclear accidents

CO-5	Constitutional provisions for the protection of natural resources
Course Code: B17 BS 1107	
Course Title: ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.
Course Code: B17 BS 1108	
Course Title: ENGLISH COMMUNICATION SKILS LAB- I	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students improve their speaking skills in real contexts.
CO-3	Students learn standard pronunciation and practice it daily discourse.
CO-4	Students give up their communicative barriers.
Course Code: B17 BS 1109	
Course Title: ENGINEERING WORKSHOP & IT WORKSHOP	
	PART-A (ENGINEERING WORKSHOP)
CO-1	Use various tools to prepare basic carpentry and fitting joints.
CO-2	Prepare jobs of various shapes using black smithy.
CO-3	Make basic house wire connections.
CO-4	Fabricate simple components using tin smithy.
	PART-B (IT WORKSHOP)
CO-1	Understand the basic components and peripherals of a computer.
CO-2	To become familiar in configuring a system.
CO-3	Learn the usage of productivity tools.
CO-4	Acquire knowledge about the netiquette and cyber hygiene.
CO-5	Get hands on experience in trouble shooting a system
Course Code: B17 BS 1111	
Course Title: INNER ENGINEERING	
CO-1	To improve his concentration levels and improve his public speaking abilities.
CO-2	To balance his academic and non-academic activities (Work Life Balance).
CO-3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
CO-4	To improve his communications skills, leadership, teamwork and decision-making abilities
CO-5	To inculcate creativity & innovation, planning & organizing as part of their life.
CO-6	Taking responsibility for themselves and people around them.
CO-7	To make their journey more fun and enjoyable.

Course Outcomes for First Year Second Semester Course	
Course Code: B17 BS 1201	
Course Title: ENGLISH – II	
CO-1	To comprehend the speech of people belonging to different backgrounds and regions.
CO-2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
CO-3	To express fluently and accurately in social discourse.
CO-4	Participate in group activities like role-plays, discussions and debates.
CO-5	Identify the discourse features, and improve intensive and extensive reading skills.
Course Code: B17 BS 1202	
Course Title: MATHEMATICS – II	
CO-1	Find a real root of algebraic and transcendental equations using different methods
CO-2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
CO-3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson"s rules.
CO-4	Solve a first order ordinary differential equation by Euler and RK methods.

CO-5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
CO-6	Find Fourier transforms Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.

Course Code: B17 BS 1203

Course Title: MATHEMATICS – III

CO-1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.
CO-2	Determine Eigen values and Eigen vectors of a given matrix Reduce a Quadratic form to its canonical form and classify.
CO-3	Evaluate double integrals over a region and triple integral over a volume.
CO-4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
CO-5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
CO-6	Evaluate line, surface and volume integrals by the use of Green"s, Stokes" and Gauss divergence theorems.

Course Code: B17 BS 1204

Course Title: ENGINEERING PHYSICS

CO-1	Learn the basic concepts of interference and diffraction of light and its applications.
CO-2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications.
CO-3	Understand the inter relationship of electric and magnetic fields and learn ultrasonic"s as a tool for technological applications
CO-4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
CO-5	Learn the basics of structures of solid materials and nano material preparation Techniques/methods.

Course Code: B17 CS 1201

Course Title: COMPUTER PROGRAMMING USING C

CO-1	Understand the basic terminology used in computer programming
CO-2	Write, compile and debug programs in C language.
CO-3	Use different data types in a computer program.
CO-4	Design programs involving decision structures, loops and functions.
CO-5	Explain the difference between call by value and call by reference
CO-6	Understand the dynamics of memory by the use of pointers
CO-7	Use different data structures and create/update basic data files.

Course Code: B17 EE 1201

Course Title: CIRCUIT THEORY

CO-1	Various electrical networks in presence of active and passive elements.
CO-2	Electrical networks with network topology concepts.
CO-3	Magnetic circuit with various dot conventions.
CO-4	R, L, C network with sinusoidal excitation.
CO-5	Three phase AC circuits.

Course Code: B17 EE 1202

Course Title: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

CO-1	Able to analyze the various Electrical networks and understand the basics of Magnetic Circuits.
CO-2	Able to understand the operation of DC generators,3-Point starter and conduct the Swinburne"s test.
CO-3	Able to analyze the Performance of Transformers.
CO-4	Able to explain the operation of three phase induction motors and alternator.
CO-5	Able to analyze the operation of Half-wave and Full-wave rectifiers and single stage CE amplifier.

Course Code: B17 BS 1206

Course Title: ENGINEERING PHYSICS LAB

CO-1	Students get hands on experience in setting up experiments and using the Instruments/equipment individually.
CO-2	Get introduced to using new/ advanced technologies and understand their significance.

Course Code: B17 BS 1208

Course Title: ENGLISH COMMUNICATION SKILS LAB- II

CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students enhance their presentation skills.

CO-3	Students participate in group discussions and improve their team skills.
CO-4	Students confidently face the interviews.

Course Code: B17 CS 1204	
Course Title: C PROGRAMMING LAB	
CO-1	Apply and practice logical ability to solve the problems.
CO-2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment**.**
CO-3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs**.**
CO-4	Understand and apply the in-built functions and customized functions for solving the problems.
CO-5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO-6	Document and present the algorithms, flowcharts and programs in form of user manuals**.**
CO-7	Identification of various computer components, Installation of software

Course Code: B17 CS 1204	
Course Title: C PROGRAMMING LAB	
CO	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper**.**

Course Outcomes for Second Year First Semester Course	
Course Code: B17BS2101	
Course Title: MATHEMATICS IV	
CO-1	Using the concept of Analytic function in applications including Electrostatics and Fluiddynamics.
CO-2	Finding theoretical solution of certain Elliptic, Parabolic and Hyperbolic partial differential equations.
CO-3	Using Z-transforms to solve linear difference equations with constant coefficients.
CO-4	Fitting of probability frequency distribution to a given data.
CO-5	Using the concepts of sampling theory to analyze data related to some large and small samples.
Course Code: B17 CE 2101	
Course Title: ELECTRONIC DEVICES AND CIRCUITS	
CO-1	Understand the physical structure, principles of operation, electrical characteristics and circuit models of diodes, BJT"s and FET"s.
CO-2	Use the concepts of semiconductor physics and electronic devices to design and fabricate simple electronic circuits.
CO-3	Use this knowledge to analyze and design amplifier circuits and oscillator circuits to be used in various applications.
CO-4	Extend the understanding of how electronic circuits and their functions fit into larger electronic systems.
Course Code: B17EE2101	
Course Title: NETWORK ANALYSIS AND SYNTHESIS	
CO-1	Students will learn the theorems for Analyzing complex networks.
CO-2	Students will outline the significance of energy storing elements (Inductance &Capacitance) in circuits and study transient behavior of responses.
CO-3	Students will learn to apply Laplace transform technique for circuit analysis and know its advantages.
CO-4	Students will learn to apply two-port network analysis for devices like amplifiers, transmission lines.
CO-5	Students will learn to apply the concept of positive real functions and the synthesis procedure for RC, LC, RL & RLC networks.
Course Code: B17EE2102	
Course Title: ELECTRO MAGNETIC FIELD THEORY	
CO-1	Find the electrostatic and magneto static fields for different configurations.
CO-2	Apply various principles and laws to estimate the effect of electric and magnetic fields.
CO-3	Distinguish between the effects of electrostatic and magneto static fields.
CO-4	Apply Maxwell's equations for static and time varying fields.
CO-5	Analyze the EM wave in different domains and compute average power density
Course Code: B17EE2103	
Course Title: ELECTRICAL MEASUREMENTS & INSTRUMENTS	

CO-1	Illustrate the characteristics of measuring instruments(K3)
CO-2	Discriminate measuring instruments based on their principle & operation (K4)
CO-3	Calculate power and energy in 1Φ, 3Φ & polyphase circuits (K3)
CO-4	Measure electrical parameters using a bridge(K3)
CO-5	Find magnetic measurements using Ballistic Galvanometers and Flux meters.(K4)
Course Code: B17BS2104	
Course Title: ENGINEERING ECONOMICS	
CO-1	Provide detailed insight about origin & definitions of economics & enlighten the students about demand analysis.
CO-2	Illustration about applications of cost Concepts & analysis of breakeven point.
CO-3	Understand about various types of Market Structure and Pricing practices implemented by the organization.
CO-4	Infuse knowledge about different Economic systems & Business cycles.
CO-5	Enlighten the students regarding the aspects of Depreciation & Financial Accounting.
Course Code: B17EE2105	
Course Title: NETWORKS & MEASUREMENTS LAB	
CO-1	Students will gain the skill to make and experiment with practical electric circuits.
CO-2	Students will be able to measure voltage, current, power in practical electric circuits.
CO-3	Students will know the significance of various theorems and their applications.
CO-4	Students will be able to assess the behavior of electric circuits.
CO-5	Students will be able to calibrate single phase energy meter, voltmeter &wattmeter
CO-6	Students will be able to measure resistance, inductance &capacitance.
Course Code: 2105	
Course Title: ELECTRONICS DEVICES AND CIRCUITS LAB	
CO-1	Design and fabricate simple circuits like diode rectifiers with filters for providing dc voltages in electronic circuits.
CO-2	Design and fabricate amplifiers with required gain for use in various communication applications.
CO-3	Design and fabricate simple electronic circuits for everyday applications like traffic control lights using relays, automatic counters using LDRs and Burglar alarms.
Course Code: B17 BS 2106	
Course Title: PROGRAMMING SKILLS-I (PYTHON)	
CO-1	Ability to apply object oriented concepts in programming.
CO-2	Ability to define, understand and differentiate different types of data types and apply them.
CO-3	Ability to recognize various concepts of python and develops the programs using them and also develop web based application.
Course Code: B17 BS 2107	
Course Title: ENGLISH PROFICIENCY-I	
CO-1	Improve speaking skills.
CO-2	Enhance their listening capabilities.
CO-3	Learn and practice the skills of composition writing.
CO-4	Enhance their reading and understanding of different texts.
CO-5	Improve their inter-personal communication skills.
CO-6	Be confident in presentation skills.
Course Code: B17 BS 2108	
Course Title: PROFESSIONAL ETHICS & HUMAN VALUES	
CO	By the end of the course student should be able to understand the importance of ethics and values in life and society.

Course Outcomes for Second Year Second Semester Course	
Course Code:B17EE2201	
Course Title: ELECTRICAL MACHINES-I	
CO-1	Identify the concepts of electro mechanical energy conversion.[K2]
CO-2	Describe the concepts of construction, operating principle, different types of DC machines and transformers, effects on DC machine and parallel operation of DC generators.[K2]
CO-3	Interpret the characteristics of DC machines. [K3]
CO-4	Discriminate different types of speed control methods of DC motors. [K4]

CO-5	Examine the performance of DC machines and transformers by different testing methods.[K4]
CO-6	Discriminate different types of transformer connections[K4]

Course Code: B17EE2202

Course Title: SIGNALS & SYSTEMS

CO-1	Characterize and analyze the properties of continuous and discrete time signals and systems.
CO-2	Apply the convolution for continuous time signals and discrete time signals.
CO-3	Evaluate the Fourier Series of periodic signals.
CO-4	Determine the Fourier Transform and Z-Transform of different type's of signals and make use of their Properties.
CO-5	Convert a continuous time signal to the discrete time domain and reconstruct using the sampling theorem.

Course Code: B17EC2205

Course Title: ELECTRONIC CIRCUIT ANALYSIS

CO-1	Know the equivalent circuit of multistage amplifier and its analysis.[K3]
CO-2	Identify the different feedback topologies and analyze them.[K1]
CO-3	Explain the principle of oscillator and design different types of sinusoidal oscillators.[K3]
CO-4	Define the difference between voltage and power amplifiers and design different classes and know that Tuned amplifiers amplify a narrow band of frequencies and will also be able to analyze them.[K1,K2,K3]
CO-5	Identify that Op-amp not only amplifies but also performs different operations and analyze some of its applications.[K1,K2]

Course Code: B17ME2206

Course Title: PRIME MOVERS & PUMPS

CO-1	Understand the concepts of hydrodynamic force of jets on stationary and moving flat inclined and curved vanes.
CO-2	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines.
CO-3	Calculate the performance of different types of internal combustion engines.
CO-4	Apply the otto, Diesel cycles for finding the performance of S.I and C.I engines. Understand the working principle of steam turbines and gas turbines.
CO-5	To impart the knowledge of various types of pumps, their constructional features, working and performance.
CO-6	To impart the knowledge of various types of turbines and the performance characteristics of hydraulic turbines

Course Code: B17ME2210

Course Title: LINEAR INTEGRATED AND PULSE CIRCUITS

CO-1	Understand the applications of Op-amps
CO-2	Design different active filters and oscillators
CO-3	Understand the applications of 555 Timers and IC regulators
CO-4	Understand the applications of integrator, differentiator, clippers and clam per circuits.
CO-5	Design different multi vibrators for various applications.

Course Code: B17BS2201

Course Title: MANAGEMENT SCIENCE

CO-1	Create awareness about the concepts like Evolution of Management thought, functions & principles of management.
CO-2	Provide all round information to the students about matters related to concepts & functions related to Marketing.
CO-3	Acquire in-depth knowledge about the concepts and functions of HRM.
CO-4	Understand about aspects of Production Management and Financial Management.
CO-5	Gain knowledge about Strategy formulation & implementation, SWOT analysis in order to compete with the competition & to gain competency advantage.

Course Code: B17ME2210

Course Title: THERMAL PRIME MOVERS LAB

CO-1	Explain the working principle of different types of IC Engines and illustrate the valve timing and port diagrams of an IC engines.
CO-2	Determine the viscosities of oil samples, Flash and Fire point values of fuels.
CO-3	Perform the load, Morse, Heat balance and economical speed test on IC Engines.
CO-4	Discuss the working principle of different types of hydraulic turbines.
CO-5	Illustrate the working principle of centrifugal and reciprocating pumps.

Course Code: B17EC2209	
Course Title: LINEAR INTIGRATED CIRCUITS & PULSE DIGITAL CIRCUTS LAB WITHSIMULATION	
CO-1	Design and conduct experiments on RC low pass and high pass circuits.
CO-2	Observe operation of UJT Sweep Generator.
CO-3	Design and test different types of Multivibrators
CO-4	Acquire a basic knowledge on simple applications of operational amplifier.
CO-5	Design, construct Schmitt trigger using operational amplifier.
CO-6	Use Multisim to test their electronic designs.
CO-7	Design and test different types of Multiplexers and counters.
Course Code: B17 BS 2205	
Course Title: PROGRAMMING SKILLS-II (JAVA)	
CO-1	Ability to define different procedural and object oriented concepts and will be able to differentiate between them.
CO-2	Ability to define, understand and differentiate different types of arrays and apply them.
CO-3	Ability to recognize various concepts of java and develops the programs using them.
CO-4	Ability to identify and differentiate the various features of AWT components to construct container based programs.
CO-5	Ability to describe and explain the concept of networking.
Course Code: B17 BS 2107	
Course Title: ENGLISH PROFICIENCY-II	
CO-1	Develop the skills of taking and making notes.
CO-2	Interpret the pictures appropriately and effectively.
CO-3	Read, comprehend and infer a given piece of writing effectively.
CO-4	Learn and practice the skills of Research writing.
CO-5	Communicate well through various forms of writing.
CO-6	Be confident in giving presentations and dealing with people.

Course Outcomes for Third Year First Semester Course	
Course Code: B17EE3101	
Course Title: ELECTRICAL MACHINES-II	
CO-1	Understand the concepts of construction, operating principle and starting methods of AC machines.
CO-2	Perform various tests on AC Machines
CO-3	Analyze the performance of different AC machines in the concepts of torque and power factor correction.
Course Code: B17EE3102	
Course Title: MICROPROCESSOR & MICROCONTROLLER	
CO-1	Understand the fundamentals of 8085 Microprocessor and microcontroller based systems.
CO-2	Familiarize with the instruction set and assembly level programming.
CO-3	Illustrate how the different peripherals (8255, 8253etc.)
CO-4	Distinguish and analyze the properties of Microprocessors & Microcontrollers.
CO-5	Apply knowledge on interfacing microcontrollers for some real time applications.
Course Code: B17EE3103	
Course Title: ELECTRICAL POWER GENERATION, TRANSMISSION & DISTRIBUTION	
CO-1	Describe the power generation from different energy sources.
CO-2	Demonstrate different tariffs of generation, Inductance & Capacitance of transmission lines.
CO-3	Analyze the various transmission and distribution systems under various conditions.
Course Code: B17EE3104	
Course Title: CONTROL SYSTEMS	
CO-1	Model electrical and mechanical physical systems by applying laws of physics
CO-2	Represent mathematical models of systems using block diagrams & Signal Flow Graphs and derive their transfer functions
CO-3	Analyze systems in time domain for transient and steady-state behavior
CO-4	Learn the concept of stability and use RH criterion and Root locus methods for stability analysis.
CO-5	Learn to obtain frequency response plots of systems and use them for system analysis and stability assessment.

Course Code: B17EE3105	
Course Title: DIGITAL ELECTRONICS AND LOGIC DESIGN	
CO-1	Understand the concepts of basic number system and Boolean
CO-2	Apply the Boolean algebra for framing the simplified expression.
CO-3	Analyze the combinational & sequential circuits using simple logic gates and PLD & PLA.
Course Code: B17EE3106	
Course Title: NON-CONVENTIONAL ENERGY SOURCES	
CO-1	Identify the need for Renewable energy
CO-2	Recognize the ways of collection of solar energy.
CO-3	Apply the knowledge of wind energy to estimate the energy potential.
CO-4	Apply the knowledge of ocean, waves and tides to estimate their energy potential.
CO-5	Understand the concepts behind geo-thermal energy and bio energy.
Course Code: B17EE3107	
Course Title: ELECTRICAL MACHINES-I LAB	
CO-1	Analyze characteristics of various types of generators & motors which will help in Understanding of machines under various conditions.
CO-2	Compare Speed control of dc motors which will be useful in various industries.
CO-3	Determine testing of machines will given idea in testing side in various industries.
Course Code: B17EE3108	
Course Title: MICROPROCESSOR AND MICRO CONTROLLER LAB	
CO-1	Evaluate the programs using basic fundamentals of 8085 Microprocessor& 8051 Microcontroller.
CO-2	Develop different programs on extended version like 8086microprocessor.
CO-3	Design programs for interfacing circuits like traffic controller, LED display board, Motor controllers etc.
CO-4	Utilize their knowledge practically in PLC designs companies. Ex: Govt. sector & Private sectors
Course Code: B17BS3101	
Course Title: PROBLEM SOLVING & LINGUISTIC COMPETENCE	
PART-A (Verbal and Soft Skills-I)	
CO-1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
CO-2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
CO-3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
CO-4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
CO-5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
Part-B (Quantitative Aptitude –I)	
CO-1	The students will be able to perform well in calculating on number problems and various units of ratio concepts.
CO-2	Accurate solving problems on time and distance and units related solutions.
CO-3	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
CO-4	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
Course Code: B17BS3105	
Course Title: IPR & PATENTS	
CO-1	Identify various types of intangible property that an engineering professional could generate in the course of his career.
CO-2	Distinguish between various types of protection granted to Intellectual Property such as Patents, Copy Rights, Trademarks etc.,
CO-3	List the steps involved in getting protection over various types of intellectual property and maintaining them.
CO-4	Take precautions in writing scientific and technical reports without plagiarism.
CO-5	Help micro, small and medium entrepreneurs in protecting their IP and respecting others IP as part of their business processes.
Course Code: B17BS3102	
Course Title: BASIC CODING	

CO-1	Know about Control Structures, Loop Structures and branching in programming.
CO-2	Know about various searching and sorting methods.
CO-3	Know about Functions, Recursions and Storage Classes.
CO-4	Know about Structures and Unions.
CO-5	Know different Operating System concepts.
CO-6	Differentiate OSI Model Vs. TCP/IP suite

Course Outcomes for Third Year Second Semester Course	
Course Code: B17EE3201	
Course Title: ADVANCED CONTROL SYSTEMS	
CO-1	Know the various components and usage of each component.
CO-2	Derive stat space model for a given systems and Apply the concept of Observability and Controllability for LTI system.
CO-3	Apply Z- transform in Engineering application related to digital control systems.
CO-4	Design classical controller based on bode plots and modern controllers based on the state space techniques
CO-5	Test the digital system which is useful after designing a particular system with respect to the stability point of view.
Course Code: B17EE3202	
Course Title: POWER ELECTRONICS	
CO-1	Explain the principle of operation of thyristor, modern power semiconductor devices and necessity of series and parallel connection of thyristors.
CO-2	Explain the operation of Firing and Commutation techniques.
CO-3	Evaluate the phase controlled rectifiers with different loads.
CO-4	Analyze different Choppers, Cyclo-converter and AC voltage Controller configurations.
CO-5	Investigate harmonic reduction techniques for inverters based on PWM techniques
Course Code: B17EE3203	
Course Title: POWER SYSTEM ANALYSIS AND STABILITY	
CO-1	Understand single line diagram, reactance diagram of the power system.
CO-2	Apply different load flow techniques to solve power system problems.
CO-3	Analyse different types of faults in a power system
CO-4	Analyse steady state and transient stability problems of power system.
Course Code: B17 EE 3204	
Course Title: DIGITAL SIGNAL PROCESSING	
CO-1	Analyse difference equations of linear time-invariant systems and Evaluate the transfer functions using Z transforms.
CO-2	Represent signals mathematically in continuous and discrete-time, and in the frequency domain.
CO-3	Solve the linear and circular convolutions of discrete-time sequences.
CO-4	Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms, relate it to the DTFT.
CO-5	Design IIR& FIR filters
Course Code: B17EE3205	
Course Title: POWER SYSTEM PROTECTION	
CO-1	Identify the need for protection and know various devices for protection and terminology used in protection.
CO-2	Discriminate the constructional details with operation principle of various types of fuses, circuit breakers, relays, lightning arresters and their applications.
CO-3	Apply the arc quenching methods to various types of circuit breakers.
CO-4	Apply various relays to various types of power system equipment like alternator, transformer and feeders and distinguish between an electromagnetic relay and a static relay.
CO-5	Identify the different causes for over voltages and choose various protection devices against over voltages.
Course Code: B17CS3214	
Course Title: OOPS THROUGH JAVA	
CO-1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
CO-2	Write, compile, execute and troubleshoot Java programming for networking concepts.
CO-3	Build Java Application for distributed environment.

CO-4	Design and Develop multi-tier applications.
CO-5	Identify and Analyze Enterprise applications

Course Code: B17ME3210

Course Title: INDUSTRIAL ROBOTICS

CO-1	Identify various robot configuration and components,
CO-2	Select appropriate actuators and sensors for a robot based on specific application
CO-3	Carry out kinematic and dynamic analysis for simple serial kinematic chains.
CO-4	Perform trajectory planning for a manipulator by avoiding obstacles
CO-5	Identify various robot configuration and components,

Course Code: B17EE3207

Course Title: ELECTRICAL MACHINES-II LAB

CO-1	Calculate the regulation of an alternator by EMF,MMF and ZPF methods.
CO-2	Verify Alternator synchronism and draw the performance characteristics, finding out different reactances.
CO-3	Find the efficiency and machine performances by conducting various tests on 3-Φ and 1-Φ induction motor.
CO-4	Verify the speed variation of induction machine.
CO-5	Calculate the regulation of an alternator by EMF,MMF and ZPF methods.

Course Code: B17EE3208

Course Title: CONTROL SYSTEMS LAB

CO-1	Formulate transfer function for given control system problems.
CO-2	Find time response of given control system model.
CO-3	Apply Root Locus and Bode plots for given control system model

Course Code: B17CE3209

Course Title: GEOTECHNICAL ENGINEERING LAB

CO-1	Identify the physical properties of soil and classify various types of soil.(K2)
CO-2	Determine the permeability of soil.(K3)
CO-3	Determine compaction characteristics of soils and Estimate in-situ density of soil.(K3)
CO-4	Determine the shear strength parameters of soils by various methods.(K3)
CO-5	Estimate the California Bearing Ratio (CBR) of a soil.(K3)
CO-6	Determine the relative density of a coarse-grained soil.(K3)

Course Code: B17CE3210

Course Title: CONCRETE TECHNOLOGY LAB

CO-1	Conduct test and find consistency and fineness of cement.
CO-2	Examine the specific gravity of cement.
CO-3	Conduct test and determine the setting times of cement.
CO-4	Determine the compressive strength of cement.
CO-5	Determine the specific gravity of coarse aggregate and fine ggregate.
CO-6	Determine the fineness modulus of coarse aggregate and fine aggregate.
CO-7	Determine the bulking of sand.
CO-8	Understand and determine workability of concrete by slump, compaction factor, flow table and Vee – Bee tests.
CO-9	Evaluate hardened properties of concrete like compressive strength, split tensile strength and flexural strength.

Course Code: B17BS3201

Course Title: EMPLOYABILITY SKILLS

	Part-A (Verbal Aptitude and Soft Skills-II)
CO-1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
CO-2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences
CO-3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).
CO-4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
CO-5	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews

	(stress, technical, HR) that they would face during the course of their recruitment process.
	Part-B (Quantitative Aptitude-II)
CO-1	The students will be able to perform well in calculating different types of data interpretation problems.
CO-2	The students will perform efficaciously on analytical and logical problems using various methods.
CO-3	Students will find the angle measurements of clock problems with the knowledge of calendars and clock.
CO-4	The students will skillfully solve the puzzle problems like arrangement of different positions.
CO-5	The students will become good at solving the problems of lines, triangulars, volume of cone, cylinder and so on.
Course Code: B17BS3203	
Course Title: ADVANCED CODING	
CO-1	Acquire coding knowledge on essential of modular programming
CO-2	Acquire Programming knowledge on linked lists
CO-3	Acquire coding knowledge on ADT
CO-4	Acquire knowledge on time complexities of different methods
CO-5	Acquire Programming skill on Java libraries and Collections

Course Outcomes for Final Year First Semester Course	
Course Code: B17EE4101	
Course Title: ELECTRIC DRIVES	
CO-1	Discriminate the speed control, starting and braking of AC and DC Drives using conventional techniques.
CO-2	Analyze the operation of Rectifier fed DC Drives
CO-3	Analyze the operation of Chopper fed DC Drives
CO-4	Apply and analyze the voltage and frequency control techniques to induction motor drive and slip power recovery schemes
CO-5	Analyze the operation of synchronous motor drives and special drives
Course Code: B17EE4102	
Course Title: POWER SYSTEM OPERATION AND CONTROL	
CO-1	Compute the economic load scheduling for Thermal and Hydro-thermal plants.
CO-2	Solve and analyze the unit commitment and optimal power flow problems.
CO-3	Analyze the frequency deviations of single area and two area power systems.
CO-4	Apply the compensation techniques for the reactive power control in transmission system.
CO-5	Apply the knowledge of engineering fundamentals to assess the power system security.
Course Code: B17EE4103	
Course Title: ELECTRIC VEHICLES	
CO-1	Analyze and understand dynamic modelling and design considerations of electrical vehicles.
CO-2	Analyze and understand the architecture of electric vehicles and power train components.
CO-3	Evaluate Battery performance parameters for EVs and understand other energy storage methods for EVs.
CO-4	Analyze and understand the electric drives using power electronic converters for EVs.
CO-5	Develop the chargers for EVs and integrate EVs intogrid
Course Code: B17 EE 4104	
Course Title: OPERATIONS RESEARCH (Elective-I)	
CO-1	Model and solve different optimization problems mathematically.
CO-2	Apply traditional approaches to minimize transportation cost.
CO-3	Apply Hungarian method to solve the optimal solution for assignment problems.
CO-4	Apply the Linear Programming methods for CPM and PERT problems
CO-5	Outline the optimal solution by applying dominance and max-min principle in game theory.
Course Code: B17 EE 4105	
Course Title: FLEXIBLE AC TRANSMISSION SYSTEMS (Elective-I)	
CO-1	Interpret the importance of reactive power and its compensation in transmission lines.
CO-2	Summarize the characteristics of TCR, TSR, FC-TCR and TSC.
CO-3	Examine the functional operation of SVC, STATCOM, TCSC & SSSC and their comparison.
CO-4	Inspect SVC & STATCOM for their applications in improvement of transient stability, Steady-State Power-Transfer Capacity, and SSR mitigation.
CO-5	Inspect TCSC & SSSC for their applications in improvement of system stability limit, system damping, Power flow control, and SSR mitigation.
Course Code: B17 EE 4106	

Course Title: INTEGRATION OF DISTRIBUTED GENERATION (Elective-I)	
CO-1	**Explain** energy generation by Wind Power, Solar Power, Combined Heat-and-Power, Hydropower, Tidal Power, Wave Power, Geothermal Power, Thermal Power Plants and interface with grid
CO-2	**Illustrate** the impact of Integration of DG"s to Power System and their issues
CO-3	**Demonstrate** the Overloading of DG"s and losses
CO-4	**Discriminate** Voltage magnitude variations of DG"s and their compensation
CO-5	**Identify** Harmonics of different frequencies related to Power Quality disturbances.

Course Code: B17 EE 4107

Course Title: HIGH VOLTAGE ENGINEERING (Elective-I)	
CO-1	**Apply the knowledge to estimate the** performance of different configurations of electrode systems subjected to high voltage.
CO-2	**Interpret** the breakdown behavior of all types of dielectric materials.
CO-3	**Apply the knowledge to comprehend** generation of High AC, DC and Impulse voltages and currents.
CO-4	**Apply** methods to measure High AC, DC and Impulse voltages and currents.
CO-5	**Analyze** the techniques of testing various equipment"s used in HV engineering and industrial applications.

Course Code: B17 E E4108

Course Title: ELECTRIC POWER QUALITY (Elective-II)	
CO-1	**Differentiate** between different types of power quality problems.
CO-2	**Explain** and **Analyze** power quality terms and power quality standards
CO-3	**Analyze** and evaluate the causes and effects of harmonic distortion.
CO-4	**Explain** the principle of voltage regulation and apply power factor improvement methods.
CO-5	**Analyze** the impact of distributed generation on power quality

Course Code: B17 EE 4109

Course Title: ENERGY MANAGEMENT AND AUDITING (Elective-II)	
CO-1	**Illustrate** the energy audit, conservation, management and various technologies.
CO-2	**Analyze** and **design** the energy efficient lighting systems.
CO-3	**Calculate** power factor and suggest location and compensation techniques.
CO-4	**Analyze** the economic aspects of energy using different methods.
CO-5	**Compute** the economic aspects by applying life cycle costing and return on investment.

Course Code: B17 EE 4110

Course Title: POWER ELECTRONICS LAB	
CO-1	**Apply** power electronic circuits for different loads and triggering methods.
CO-2	**Compare** the characteristics of power semiconductor devices
CO-3	**Analyze** the operation of controlled rectifiers and choppers
CO-4	**Analyze** the operation of AC voltage controllers and Cyclo converter
CO-5	**Analyze** the operation of inverters

Course Code: B17 EE 4111

Course Title: POWER SYSTEM SIMULATION LAB	
CO-1	Acquire knowledge to write the matlab program for the Ybus, Load flows, Economic Load Dispatch considering with and without losses.
CO-2	**Construct** the Simulink models for the simulation of transient and steady state stabilities in power systems, load frequency control of single and two-area system using MATLAB/ SIMULINK software.
CO-3	Attain proficiency in usage of MATLAB/SIMULINK software tool.
CO-4	Evaluate the quality of Bitumen
CO-5	Develop an excel sheet for the design of structural elements
CO-6	Model and analyze the beams and plane frames using STAAD

Course Outcomes for Final Year Second Semester Course	
Course Code: B17EE 4201	
Course Title: ELECTRICAL MACHINE DESIGN	
CO-1	Understand the concept of magnetic circuits, temperature rise in electrical machines
CO-2	Understand the concept of transformers design & their windings
CO-3	Examine various losses in DC machines& their classification
CO-4	Understand the design procedures of Induction Machines & Classification
CO-5	Understand design procedures of synchronous machine and induction machines.

Course Code: B17 EE 4202	
Course Title: ELECTRICAL DISTRIBUTION SYSTEMS (Elective-III)	
CO-1	**Apply** engineering fundamentals to obtain different load modelings and their characteristics.
CO-2	**Identify** the optimal location of substation and **Design** a radial and loop type distribution feeder.
CO-3	**Compute** voltage drop and power loss in a distribution system under uniform and non-uniform distribution loads.
CO-4	**Identify** the types of faults in distribution system and select suitable protection schemes.
CO-5	**Design** a suitable capacitor for power factor correction and voltage compensation in a distribution system.
Course Code: B17 EE 4203	
Course Title: UTILIZATION OF ELECTRICAL ENERGY AND TRACTION (Elective-III)	
CO-1	**Identify** different heating and welding methods for industrial applications.
CO-2	**Employ** different lamps and **analyze** lighting schemes for illumination of residential, commercial and industrial environments.
CO-3	**Illustrate** the speed control and braking of traction motors by applying basic principles.
CO-4	**Analyze** electric traction systems under braking and acceleration conditions.
CO-5	**Analyze** electrolytic processing techniques used in industries and **Apply** the knowledge of electric wiring to air-conditioning and Refrigeration systems.
Course Code: B17 EE 4204	
Course Title: HVDC TRANSMISSION (Elective–III)	
CO-1	**Apply** engineering fundamentals to understand operation of basic converters and links used in HVDC transmission system.
CO-2	**Analyze** 6-pulse and 12-pulse converters and used in HVDC Transmission.
CO-3	**Analyze** different types of harmonics produced by HVDC converters and **Suggest** suitable filters to eliminate the harmonics.
CO-4	**Analyze** voltage Interactions problems between HVDC and HVAC systems and the control for MTDC systems
CO-5	**Analyze** about different types of faults will occur and techniques to protect equipment used in HVDC transmission systems
Course Code: B17 EE 4205	
Course Title: POWER SYSTEM PROTECTION LAB	
CO-1	**Examine** different protection relays.
CO-2	**Analyze** the performance of synchronous machine by using synchronous reactance and power angle curve.
CO-3	**Determine** the parameters of transmission line and three phase transformers.
CO-4	**Compute** the dielectric strength of insulating oil
Course Code: B17 EE 4207	
Course Title: PROJECT WORK	
CO-1	Identify a current problem through literature/field/case studies
CO-2	Identify the background objectives and methodology for solving the same.
CO-3	Design a technology/ process for solving the problem.
CO-4	Develop a technology/ process for solving the problem.
CO-5	Evaluate that technology/ process at the laboratory level.